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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/725,801 | 12/02/2003 | Wen-Chau Liu | 370.7978USU | 3318 |

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EXAMINER


NGUYEN, JOSEPH H

ART UNIT PAPER NUMBER

2815

DATE MAILED: 12/23/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|-------------------------------|----------------------------|---|
| Office Action Summary | Application No. 10/725,801 | Applicant(s) LIU ET AL. | |
| | Examiner Joseph Nguyen | Art Unit 2815 |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-13 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) ____ is/are allowed.
- 6) ☒ Claim(s) 1,4,7-9,11 and 12 is/are rejected.
- 7) ☒ Claim(s) 2,3,5,6 and 10 is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|--|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. ____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date ____ | 6) <input type="checkbox"/> Other: ____ |

DETAILED ACTION

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 4, 7-9 and 12 are rejected under 35 U.S.C. 102(b) as being anticipated by Okamura.

Regarding claim 1, Okamura discloses on figure 1e a semiconductor diode with hydrogen direction capability comprising a semiconductor substrate 1; a doped semiconductor active layer 9 formed on said substrate and made from a compound having the formula XYZ, in which X is a group III element, Y is another group III element different from X, and Z is a group V element (col. 3, lines 45-50); an ohmic contact layer 10, 11 formed on said active layer; and a Schottky barrier contact layer 14 formed on said active layer 9 so as to provide a Schottky barrier therebetween, said Schottky barrier contact layer being made from a metal (col. 3, lines 65-68).

Note that the phrase “capable of dissociating a hydrogen molecule into hydrogen atoms” is merely functional language and therefore does not structurally distinguish from Okamura herein.

Regarding claim 4, Okamura discloses on figure 1e said compound of said active layer 9 is selected from the group consisting of n type $\text{Al}_x\text{Ga}_{1-x}\text{As}$ (col. 3, lines 45-50).

Regarding claim 7, Okamura discloses on figure 1e a semiconductor buffer layer 2 sandwiched between said substrate 1 and said active layer 9.

Regarding claim 8, Okamura discloses on figure 1e said buffer layer 2 is made from undoped GaAs (col. 3, lines 47-48) and has a thickness ranging from 1000 to 5000 Å (col. 2, lines 50-53).

Regarding claim 9, Okamura discloses on figure 1e said substrate 1 is made from semi-insulating GaAs (col. 2, lines 49-50).

Regarding claim 12, Okamura discloses on figure 1e said metal of said Schottky barrier contact layer 14 is selected from the group consisting of Pt (col. 3, lines 65-68).

Claims 1, 4, 7 and 9 are rejected under 35 U.S.C. 102(b) as being anticipated by Ohshima.

Regarding claim 1, Ohshima discloses on figure 21 a semiconductor diode with hydrogen direction capability comprising a semiconductor substrate 50; a doped semiconductor active layer 54 formed on said substrate and made from a compound having the formula XYZ, in which X is a group III element, Y is another group III element different from X, and Z is a group V element; an ohmic contact layer 64, 66 formed on said active layer; and a Schottky barrier contact layer 68 formed on said active layer 54 so as to provide a Schottky barrier therebetween, said Schottky barrier contact layer being made from a metal (col. 13, lines 49-50).

Note that the phrase "capable of dissociating a hydrogen molecule into hydrogen atoms" is merely functional language and therefore does not structurally distinguish from Okamura herein.

Regarding claim 4, Ohshima discloses on figure 21 said compound of said active layer 54 is selected from the group consisting of n type $\text{Al}_x\text{Ga}_{1-x}$.

Regarding claim 7, Ohshima discloses on figure 21 a semiconductor buffer layer 52 sandwiched between said substrate 50 and said active layer 54.

Regarding claim 9, Ohshima discloses on figure 21 said substrate 50 is made from semi-insulating GaAs.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to

consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over Okamura as applied to claim 1 above.

Regarding claim 11, Okamura discloses on figure 1e said ohmic contact layer 10, 11 is made from AuGe (col. 3, lines 53-54). Okamura does not disclose said ohmic contact layer having a thickness of 1000 to 5000 Å. However, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify Okamura by having said ohmic contact layer having a thickness of 1000 to 5000 Å for the purpose of providing a specific application to a semiconductor device, since it has been held that where the general conditions of a claim are disclosed in the prior art discovering the optimum or working ranges involves only routine skill in the art. In re Aller, 105 USPQ 233.

Allowable Subject Matter

Claims 2, 3, 5, 6 and 10 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Joseph Nguyen whose telephone number is (571) 272-

1734. The examiner can normally be reached on Monday-Friday, 7:30 am- 4:30 pm. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tom Thomas can be reached on (571) 272-1664. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306 for regular communications.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

JN
December 20, 2004


ALLAN R. WILSON
PRIMARY EXAMINER